Researchers Examine How Viruses Destroy Bacteria

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Viruses are well known for attacking humans and animals, but some viruses instead attack bacteria. Texas A&M University researchers are exploring how hungry viruses, armed with transformer-like weapons, attack bacteria, which may aid in the treatment of bacterial infections.

The Texas A&M researchers' work is published in the renowned journal *Nature Structural & Molecular Biology*.

The attackers are called phages, or bacteriophages, meaning eaters of bacteria.

The word bacteriophage is derived from the Greek "phagein," meaning eater of bacteria.

"The phages first attach to the bacteria and then inject their DNA," says Sun Qingan, coauthor of the article and a doctoral student at Texas A&M. "Then they reproduce inside the cell cytoplasm."

After more than 100 phage particles have been assembled, the next step is to be released from the bacterial host, so that the progeny virions can find other hosts and repeat the reproduction cycle, Sun adds.

Besides the cell membrane, the phages have another obstacle on their way out - a hard shell called cell wall that protects the bacteria. Only by destroying the cell wall can the phages release their offspring.

But, don't worry. The phages have a secret weapon - an enzyme that can destroy the wall from inside, thus called endolysin.

"One of the special examples, R21, remains inactive when it is first synthesized and attached to the membrane as demonstrated in our paper," Sun explains. "But when the enzyme leaves the membrane, it restructures just like a transformer and gains the power to destroy the cell wall."

The trigger controlling the transformation process is a segment of the enzyme call the SAR domain, according to the Texas A&M team.

"The SAR domain is like the commander - it tells the enzyme when to begin restructuring and destroying the cell wall," he says. "This finding enables us to better understand the release process and provides us with a possible target when we want to control the destruction of bacteria cell walls or prohibit this action in some infectious diseases."

Some research has been conducted to explore the possibility of using phages to kill bacteria and thus treating bacterial infections.

Sun and colleagues' finding unveils one secret of the phages and may be useful in phage therapy and other applications.

Source: Texas A&M University